Chapter 1
Introduction

1-1. Purpose

This manual provides guidance to help Districts in developing innovative plans to use precast concrete segments and other prefabricated elements for construction of navigation projects. The primary emphasis is on describing engineering activities necessary during the project development process that may differ from those needed for a project using traditional design and construction methods.

1-2. Applicability

This manual applies to all USACE commands having responsibility for civil works projects.

1-3. References

Required and related references are presented in Appendix A.

1-4. Distribution Statement

Approved for public release; distribution is unlimited.

1-5. Background

Navigation projects have traditionally been constructed within cofferdams, which have often been overtopped during flood events. Also, construction and maintenance of cofferdams have been time consuming and costly. Technology exists, largely practiced in the construction of bridges and offshore oil facilities, that will permit some navigation projects to be constructed without cofferdams. This can be achieved by preparing foundations underwater, precasting/prefabricating the shells of major concrete components offsite, placing these thin precast elements on the prepared foundation, and then filling them with concrete. Other options include the use of floating segments that are delivered to the site afloat and remain afloat such as floating guide walls. Use of this technology can have benefits related to cost savings, rapid completion of construction, fewer delays due to weather or water conditions, less interference with existing traffic, and less environmental impact. Several USACE navigation projects have been or are currently being designed to use these construction methods (see Appendix B). Appendix C contains examples of the types of construction discussed in this manual.

1-6. Policy

Navigation project construction is limited by the availability of Federal funds and cost-sharing trust funds. To ensure that the Nation's inland navigation system remains capable of providing necessary transportation services, it is essential that the cost of each proposed construction project be kept to a minimum. Therefore, it is mandatory that each study of expanding or constructing new navigation locks and dams includes an evaluation of prefabricated construction methods as a potential cost reduction measure. Even if potential cost savings are not possible, use of precast construction methods should be considered because of other potential benefits.

1-7. Scope

This manual describes the engineering management issues that will be significant during planning, design, and construction of navigation projects without cofferdams. In some cases, these will differ considerably from traditional methods of construction. Chapter 2 describes the various types of

prefabricated construction and some of their relative advantages. Chapter 3 identifies aspects of the planning and design process that may require special attention or different resources from more traditional construction projects. Chapter 4 describes specific engineering and construction issues that must be addressed during project development. This manual does not include specific criteria applicable to the design of project features.

1-8. Mandatory Requirements

As a potential cost-saving measure, development of designs for major rehabilitation or new construction of inland navigation projects must include an evaluation of using prefabricated structural elements to eliminate the need for cofferdams. This manual contains no other mandatory requirements. However, the manual represents recommended USACE practice for project development utilizing these innovative concepts. Where other Corps guidance documents are referenced, the designer must review each document to determine which of its mandatory requirements are applicable to the design.

1-9. Conclusions

These types of construction methods have application for navigation projects. They have been used successfully on many heavy construction projects that serve as precedents for the design of navigation projects. The elimination/reduction of large cofferdams, the reduction of in situ construction time, and the reduction of delays to navigation during construction are among the largest benefits of these methods. Examples of these methods will become more numerous as more projects realize and use the benefits of such practices. Although these methods generally use common materials, the design, procedures, equipment, and possibly contracts are not common to Corps practice. Specialized and additional engineering resources and procedures will be required to develop a plan, design and construct the project, and inspect and maintain the completed project.